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IS 2141 (2000): Hot Dip Galvanized Stay Strand [MED 10: Wire Ropes and Wire Products]

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(चौथा पुनरीक्षण)

Indian Standard

HOT DIP GALVANIZED STAY STRAND — SPECIFICATION

(Fourth Revision)

ICS 77.140.65

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BUREAU OF INDIAN
MANAK BHAVAN, 9 BAHADUR
NEW DELHI 110002

December 2000

Price Group 2

AMENDMENT NO. 1 MAY 2002
TO
IS 2141 : 2000 HOT DIP GALVANIZED STAY STRAND — SPECIFICATION

(Fourth Revision)

(*Page* 3, *clause* **10**) — Substitute the following for the existing:

'10 SAMPLING

10.1 Unless otherwise agreed upon between the supplier and the purchaser, the sampling plan as given in Annex A shall be followed except for chemical analysis.

10.2 One sample shall be drawn from each lot for chemical analysis. The lot shall be declared in conformity with the requirements if all the test results satisfy the relevant requirements.'

(ME 10)

Reprography Unit, BIS, New Delhi, India

Wire Ropes and Wire Products Sectional Committee, ME10

FOREWORD

This Indian Standard (Fourth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Wire Ropes and Wire Products Sectional Committee had been approved by the Mechanical Engineering Division Council.

This Indian Standard was first issued in 1962, revised in 1968,1979 and 1992. In 1979 revision, two additional grades were included. In 1992 revision, galvanized stay strand for earthing in power transmission lines was deleted from the scope as the same is covered in IS 12776:1989 'Galvanized strands for earthing'. The experience gained in the implementation of this standard necessitated the present revision. In this revision breaking load values have been modified and 5-wire strand has been deleted. Least count requirement of tensile testing machine has been specified.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the results of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

HOT DIP GALVANIZED
STAY STRAND — SPECIFICATION

(Fourth Revision)

1 SCOPE

This standard covers requirements for hot dip galvanized stay strands for telegraph and telephone poles, transmission line poles, signal poles, railway track signals.

2 REFERENCES

The following standards contain provisions, which through reference in this text constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standard indicated below:

IS No.	*Title*
1755 : 1983	Method of wrapping test for metallic wire (*first revision*)
2363 : 1981	Glossary of terms relating to wire ropes (*first revision*)
4826 : 1979	Hot dipped galvanized coatings on round steel wires (*first revision*)
4905 : 1968	Methods for random sampling
6594 : 1977	Technical supply conditions for steel wire ropes and strands (*first revision*)

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 2363 shall apply.

4 MATERIAL

The wires shall be cold drawn from steel made by open hearth basic oxygen or electric furnace process and of such quality that when drawn to the size of wire specified and coated with zinc, the finished strand and the individual wires shall be of uniform quality and have the properties and characteristics as specified in this specification. The wire shall not contain sulphur and phosphorus exceeding 0.060 percent each.

5 TENSILE GRADES

The wires shall be any one of the following grades :

Grade	*Tensile Grade*	*Minimum Tensile Strength* (N/mm^2)
1	1 770	1 770
2	1 570	1 570
3	1 100	1 100
4	700	700
5	450	450

6 GENERAL REQUIREMENTS

6.1 Lay

6.1.1 The outer wires of strand shall have a right hand lay (z) unless otherwise specified by the purchaser. In 19 and 37 wire strands the outer 12 and 18 wires respectively shall be generally laid up in reverse direction to that of the inner layer but they may be laid up in the same direction if agreed to between the manufacturer and the purchaser.

6.1.2 The lay length of 3, 4, 7, 19 and 37 wire strands shall be 12 to 18 times the strand diameter.

6.2 Minimum Breaking Force of Wires

The minimum breaking force of single wires shall be as specified in Table 1 (*see* Annex B).

6.3 Construction

6.3.1 The galvanized stay strand shall be of 3, 4, 7, 19 and 37 wire construction. The wires shall be so stranded together that when an evenly distributed pull is applied at the end of the completed strand, each wire shall take an equal share of pull.

6.3.2 For grade 5, no joint shall be made during stranding for strands with 3 and 4 wires. For strand with 7 wires, joint shall be permitted in the individual wires during stranding but these stranding joints shall be not less than 15 metres apart in the finished strand.

6.3.3 For grade 4, no joint shall be made during stranding for strands with 3 and 4 wires. For strand with 7 wires, joint shall be permitted in the individual wires during stranding but these stranding joints shall be not less than 15 metres apart in the finished strand.

6.3.4 For grades 3 and 2, no joint shall be made during stranding for strands with 3 and 4 wires. For strand with 7 wires, joint shall be permitted in the individual wires during stranding but these stranding joints shall be not less than 15 metres apart in the finished strand.

6.3.5 For grade 1, no joint shall be made during stranding for strands [illegible] with 7 [illegible] wires during stranding but these stranding joints shall be not less than 15 metres apart in the [illegible]

6.3.6 For [illegible] wires strands, joints in the wires during stranding shall be permitted

Table 2 Tolerance on Galvanized Wire Diameter

(*Clause* 8.2.1)

All dimensions in millimetres.

Size of wire (1)	Tolerance (2)
0.80	± 0.030
1.25 1.60	+ 0.040 - 0.030
2.00 2.24	+ 0.050 0.030
2.50 3.15 4.00	+ 0.060 – 0.030

machine grips. The force shall be applied at a steady rate not exceeding 100 N/ mm^2 per second. An initial force of 10 percent of the specified breaking force shall be applied to the test piece, at which stage the distance apart of the testing machine grips shall be as specified in IS 6594.

9.1.1 The elongation shall be determined as the percentage increase in separation between the grips from the position after application of the initial force to the position at the initial failure in the test piece. Elongation test shall be made on length of strand, which does not contain wire joints. The percentage elongation of the strand shall not be less than that specified below on the measured gauge length of 600 mm:

Grade	*Minimum Percentage Elongation*
1	2
2	3
3	4
4	6
5	10

Strand gauge length is same as the test length.

9.1.2 If the test piece breaks within 25 mm of the grips of the testing machine and shows less than the specified elongation, the test shall be disregarded and further tests made until the breakage occurs more than 25 mm from the grips. Additional test pieces shall be taken from the same coil or drums when the previous tests are to be disregarded.

9.1.3 When tested in accordance with **9.1** the minimum breaking force of the strand shall be in accordance with the requirement of Table 1 (*see* Annex B).

9.2 Galvanizing Test

The zinc coating shall conform to 'Heavy Coating' as laid down in IS 4826.

10 SAMPLING

Unless otherwise agreed upon between the supplier and the purchaser, the sampling plan as given in Annex A shall be followed.

11 MARKING

11.1 The size, construction, tensile designation, lay, coating, length, mass, manufacturer's name or trade mark, lot number along with the order number of purchaser and any other marking which may be specified by the purchaser, shall be legibly stamped on a suitable tag securely attached when galvanized stay strands are supplied in coils.

In case galvanized stay strands are supplied in reels, the information may be stenciled on both sides of the reels or stenciled on one side of the reel and a suitable tag giving the same information be attached on the other side of the reel.

11.2 BIS Certification Marking

11.2.1 The product may also be marked with the Standard Mark.

11.2.2 The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which a license for the use of Standard Mark may be granted to the manufacturers or the producers may be obtained from the Bureau of Indian Standards

12 PACKING

The rope shall be suitably protected to avoid damage in transit and corrosion.

Table 1 Breaking Force of Galvanized Stay Strand

(*Clauses* 6.2 *and* 9.1.3)

No. of Wires and Construction	Wire Diameter	Nominal Strand Diameter	Minimum Breaking Force of Single Wire Before Stranding (kN)					Minimum Breaking Force of Strand (kN)				
			Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
			(1770)	(1570)	(1100)	(700)	(450)	(1770)	(1570)	(1100)	(700)	(450)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1x3	3.15	6.79	13.80	12.24	8.58	5.46	3.51	40.1	35.6	24.9	15.9	10.2
1x4	3.15	7.60	13.80	12.24	8.58	5.46	3.51	52.4	46.5	32.6	20.7	13.3
1×7 (6-1)	0.80	2.40	0.89	0.79	0.56	0.36	0.23	5.5	4.9	3.4	2.2	1.4
	1.25	3.75	2.18	1.93	1.35	0.86	0.56	13.5	12.0	8.4	5.4	3.4
	1.60	4.80	3.56	3.16	2.22	1.41	0.91	22.2	19.7	13.8	8.8	5.6
	2.00	6.00	5.56	4.94	3.46	2.20	1.42	34.7	30.8	21.6	13.7	8.8
	2.24	6.72	6.98	6.20	4.34	2.76	1.78	43.5	38.6	27.0	17.2	11.1
	2.50	7.50	8.70	7.72	5.40	3.44	2.22	54.2	48.1	33.7	21.4	13.8
	3.15	9.45	13.80	12.30	8.58	5.46	3.51	86.0	76.3	53.5	34.0	21.9
	4.00	12.00	22.25	19.75	13.85	8.80	5.66	139	123	86.2	54.9	35.3
1×19 (12/6-1) (12:6-1)	0.80	4.00	0.89	0.79	0.56	0.36	0.23	14.9	13.2	9.2	5.9	3.8
	1.25	6.25	2.18	1.93	1.35	0.86	0.56	36.3	32.2	22.6	14.4	9.2
	1.60	8.00	3.56	3.16	2.22	1.41	0.91	59.5	52.8	37.0	23.5	15.1
	2.00	10.00	5.56	4.94	3.46	2.20	1.42	93.0	82.5	57.8	36.8	23.6
	2.24	11.20	6.98	6.20	4.34	2.76	1.78	117	103	72.5	46.1	29.7
	2.50	12.50	8.70	7.72	5.40	3.44	2.22	145	129	90.3	57.5	36.9
	3.15	15.75	13.80	12.30	8.58	5.46	3.51	231	205	143	91.2	58.6
	4.00	20.00	22.25	19.75	13.85	8.80	5.66	372	330	231	147	94.6
1×37 (18/12/6-1) (18:12/6-1) (18:12:6-1)	0.80	5.60	0.89	0.79	0.56	0.36	0.23	28.8	25.5	17.9	11.4	7.3
	1.25	8.75	2.18	1.93	1.35	0.86	0.56	70.3	62.3	43.7	27.8	17.9
	1.60	11.20	3.56	3.16	2.22	1.41	0.91	115	102	71.5	45.5	29.3
	2.00	14.00	5.56	4.94	3.46	2.20	1.42	180	160	112	71.1	45.7
	2.24	15.68	6.98	6.20	4.34	2.76	1.78	226	200	140	89.2	57.4
	2.50	17.50	8.70	7.72	5.40	3.44	2.22	281	249	175	111	71.4
	3.15	22.05	13.80	12.30	8.58	5.46	3.51	446	396	277	176	113
	4.00	28.00	22.25	19.75	13.85	8.80	5.66	719	638	447	284	183

NOTE Refer Annex B for conducting tensile test.

provided they are kept to a minimum and well spaced that is at least 15 metres apart.

7 FREEDOM FROM DEFECTS

The wire shall be circular and free from scale, irregularities, imperfections, flaws, splits, and other defects, which may affect the quality of wire. The zinc coating shall conform to IS 4826.

8 TEST ON WIRES BEFORE MANUFACTURE

8.1 Ductility Test

The wire shall be subjected to wrapping test in accordance with IS 1755. When wrapped for eight close turns around its own diameter and on being subsequently unwrapped for seven turns the wire shall not break or split.

8.2 Tolerance on Wire Diameter

The diameter of the test piece shall be determined with a suitable micrometer by taking two measurements at diametrically opposite points at three places along a length of not less than 250 mm and the average of these size measurements shall be taken as the diameter of the galvanized wire.

8.2.1 The tolerance on the diameter shall be as given in Table 2.

9 TEST ON COMPLETED STRAND

9.1 Tensile And Elongation Test

The end of the strand shall be suitably prepared by either filling in the interstices with finer wires or other suitable means, to minimize failure at the testing

ANNEX A

(*Clause* 10)

SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY

A-1 LOT

All the coils of the galvanized stay strand of the same grade, diameter, and construction manufactured under essentially similar condition be grouped to constitute the lot.

A-2 For ascertaining the conformity of the lot to the requirements of this specification, test shall be carried out for each lot separately. The number of coils to be selected at random from each lot and shall be in accordance with col 1 and 2 of Table 3. To ensure the randomness of selection, reference may be made to IS 4905.

A-2.1 From each of the coils so selected in the sample, a suitable test specimen shall be cut and tested for various requirements. The lot shall be accepted, if no defect is found in the sample.

Table 3 Sample Size and Criteria for Conformity

(*Clause* A-2)

Lot Size (1)	Sample Size (2)
Up to 25	3
26 to 50	5
51 to 150	8
151 to 300	10
301 and above	13

ANNEX B

(*Clauses* 6.2 *and* 9.1.3)

DETAILS OF TENSILE TESTING MACHINES

B-1 The tensile testing shall be conducted in suitable machines having at least following capacities:

Breaking Force	*Least Count*
Up to 6.5 kN	0.01 kN
Above 6.5 kN up to 13.0 kN	0.02 kN
Above 13.0 kN up to 32.5 kN	0.05 kN
Above 32.5 kN up to 65.0 kN	0.10 kN
Above 65.0 kN	1.0 kN

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